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# POISON IVY POISON OAK AND POISON SUMAC

IDENTIFICATION  
PRECAUTIONS  
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# POISON IVY, POISON OAK, AND POISON SUMAC

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Many people are accidentally poisoned each year from contact with plants that they did not know were harmful. If they had known how to recognize these poisonous plants, they could have escaped the painful experience of severe skin inflammation and water blisters. Few persons have sufficient immunity to protect them from poisonous plants. Many people do not recognize these plants although they occur in almost every part of the United States in one or more of their various forms (fig. 1).

Poisoning is largely preventable. A knowledge sufficient to identify plants in their various forms is easily gained by anyone who will study pictures and general descriptions, then train himself by diligent practice in observing the plants in his locality. Children should be taught to recognize the plants and to become poison ivy conscious.

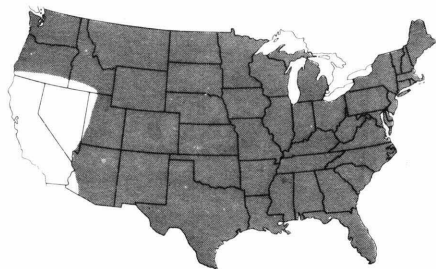
## POISON IVY AND POISON OAK

Poison ivy and poison oak are neither ivy nor oak species. Rather, they belong to the cashew family and are known by a number of local names, and several different kinds of plants are called by these names. Plants vary greatly throughout the United States. They grow in the form of: (1) woody vines attached to trees or objects for support, (2) trailing shrubs mostly on the ground, or (3) erect woody shrubs entirely without support. They may flourish in the deep woods, where

soil moisture is plentiful, or in very dry soil on the most exposed hillsides. Plants are most frequently abundant along old fence rows and edges of paths and roadway. They ramble over rock walls and climb posts or trees to considerable height. Often they grow with other shrubs or vines in such ways as to escape notice (fig. 2).

Leaf forms among plants or even on the same plant are as variable as the habit of growth; however, the leaves almost always consist of three leaflets. The old saying, "Leaflets three, let it be," is a reminder of this consistent leaf character but may lead to undue suspicion of some harmless plant. Only one three-part leaf leads off from each node on the twig. Leaves never occur in pairs along the stem.

Flowers and fruit are always in clusters on slender stems that originate in the axils, or angles, between the leaves and woody twigs. Berrylike fruits usually have a white, waxy appearance and ordinarily are not hairy, but may be so in some forms. The plants do not always flower and bear

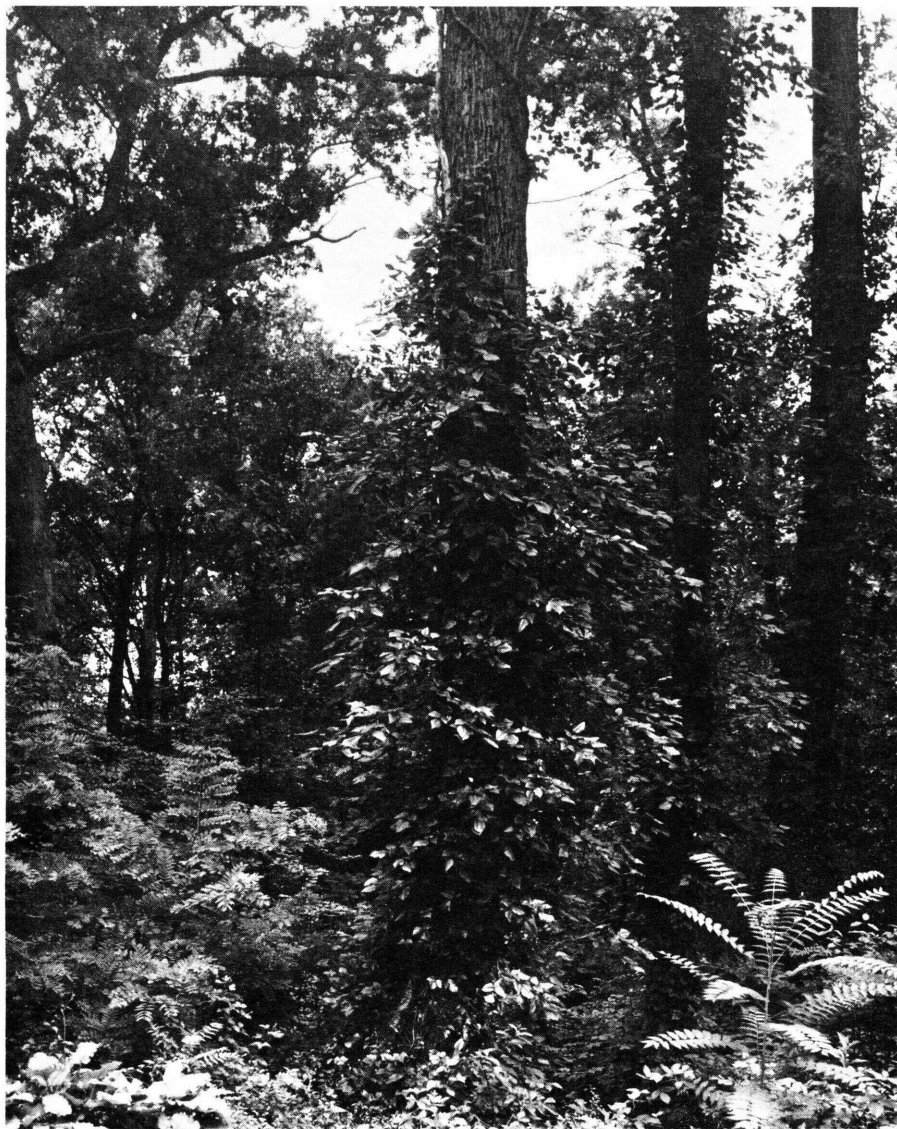


**Figure 1.** The shaded part shows the extensive area where some form of common poison ivy may grow.

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fruit. The white or cream-colored clusters of fruit, when they occur, are significant identifying characters, especially after the leaves have fallen.

For convenience, these plants are discussed under three divisions—common poison ivy, poison oak, and Pacific poison oak.



BP1-309

**Figure 2.** Large leafy branches of poison ivy covering lower trunk of tree. Rope-like vine more than 2 inches in diameter extends upward to top of tree. Clump of smooth sumac in lower left and single plant of staghorn sumac in lower right, both nonpoisonous.



## Common Poison Ivy <sup>2</sup>

The plant is known by various local names—poison ivy, three-leaved ivy, poison creeper, climbing sumac, poison oak, markweed, picry, and mercury. Common poison ivy may be considered as a vine in its most typical growth habit.

Vines often grow for many years, becoming several inches in diameter and quite woody. Slender vines may run along the ground, grow with shrubbery, or take support from a tree. That a plant growing along the edge of a lawn and into the shrubbery may be inconspicuous as compared with a vine climbing on a tree is shown in figure 3, *A*. The vine develops

<sup>2</sup> *Rhus radicans*

roots readily when in contact with the ground or with any object that will support it. When vines grow on trees, these aerial roots attach the vine securely (fig. 3, *B*). A rank growth of these roots often causes the vines on trees to have the general appearance of a fuzzy rope.

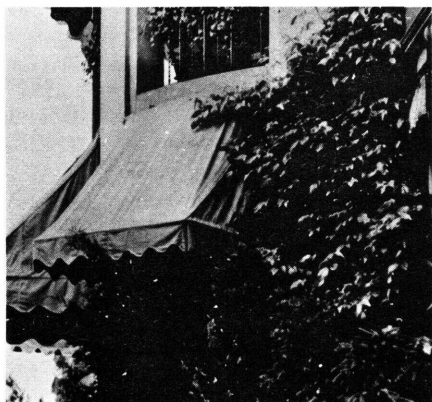
The vines and roots apparently do not cause injury to the tree except where growth may cover the supporting plant and exclude sunlight. The vining nature of the plant makes it well adapted to climbing over stone walls or on brick and stone houses.

Poison ivy may be mixed in with ornamental shrubbery and vines. This often results in its cultivation as an ornamental vine by people who do not recognize the plant. An ivy plant growing on a house (fig. 4) may be



BP1-357, DN 523

**Figure 3.** *A*, Common poison ivy growing in a hedge and on a shade tree on the edge of a lawn. *B*, Typical vine and leaves. The roots attach the vine to the tree.



BP1-299

**Figure 4. Common poison ivy growing on side of house with ornamental shrubs.**

prized by an unsuspecting owner. The vine is attractive and sometimes turns a brilliant color in the fall. Do not tolerate its use as an ornamental. This use can result in cases of accidental poisoning, and these plants may serve as propagating stock for more poison ivy in the vicinity.

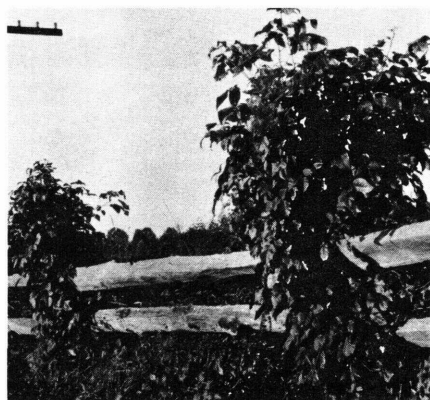
Poison ivy, mixed in with other vines, may be difficult to detect, unless you are trained in recognizing the plant. Virginia creeper and some forms of Boston ivy often are confused with it. You can recognize Virginia creeper by its five leaflets radiating from one point of attachment. Boston ivy with three leaflets is sometimes difficult to detect. Study a large number of Boston ivy leaves and you will usually find some that have only one deeply lobed blade or leaflet. Poison ivy has the three leaflets. A number of other plants are easily confused with poison ivy. Learn to know poison ivy on sight, through practiced observation, then make sure by looking at all parts of the suspected plant.

Common poison ivy in full sunlight grows more as a shrub than as a vine along fence rows or in open fields. In some localities, the common form is a low-growing shrub that is 6 to 30 inches tall. Both forms usually have rather extensive horizontal systems of

rootstocks or stems at or just below the ground level. Under some conditions, the vining form later becomes a shrub. Plants of this type (fig. 5) may start as a vine supported on a fence and later extend upright stems that are shrublike. In some localities, the growth form over a wide range is consistently either vine or shrub type. In other areas, common poison ivy apparently may produce either vines or shrubs.

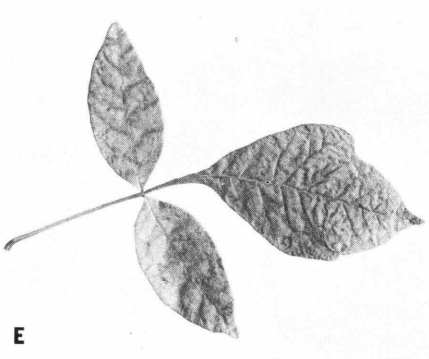
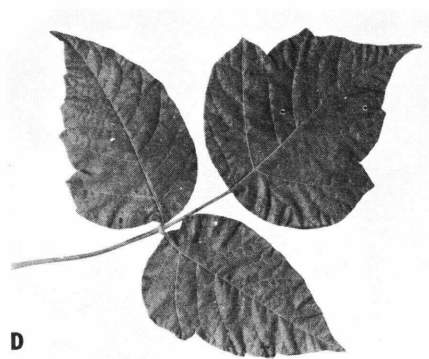
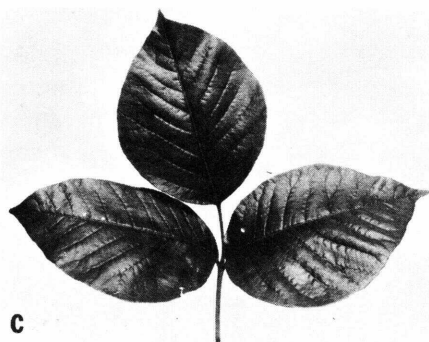
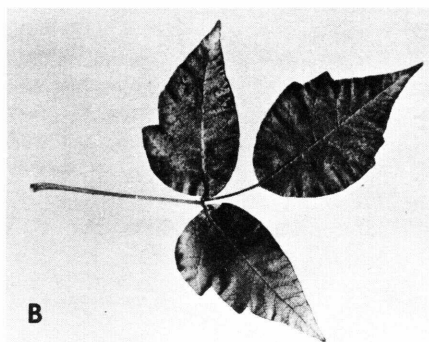
Leaves of common poison ivy are extremely variable, but the three leaflets are a constant character. The great range of variation in the shape or lobing of the leaflets is impossible to describe. The five leaves shown in figure 6 give a fair range of patterns. Other forms may be found. One plant may have a large variety of leaf forms, or it may have all leaves of about the same general character. The most common type of leaf having leaflets with even margins is shown in figure 6, *A*. Other forms in figure 6 are not quite so widespread but may be the usual type throughout some areas.

Most vines or shrubs of poison ivy produce some rather inconspicuous flowers (fig. 6, *A*) that are always in quite distinct clusters arising on the side of the stem immediately above a leaf (fig. 7, *A*). Frequently, the flowers do not develop or are abortive and



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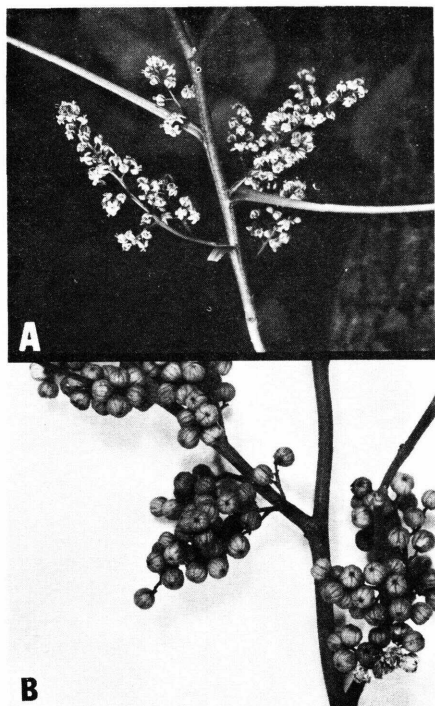
**Figure 5. Common poison ivy growing along fence row.**



DN-522, 6993-B

**Figure 6.** *A*, Common poison ivy vine with clusters of flowers in the axil of each leaf. *B*, *C*, *D*, *E*, Less-common leaf forms that may occur on the same or different plants of common poison ivy.





301—A, 7001—B  
**Figure 7. Common poison ivy: A, Flowers; B, mature fruit.**

no fruit is produced. Poison ivy fruits are white and waxy in appearance and have rather distinct lines marking the outer surface, looking like the segments in a peeled orange (fig. 7, B).

In some forms of poison ivy, the fruit is covered with fine hair, giving it a downy appearance; however, in the more common form fruits are entirely smooth. The fruit is especially helpful in identifying plants in late fall, winter, and early spring when the leaves are not present.

### Poison Oak <sup>3</sup>

Poison oak is more distinctive than some other types. Some people call it oakleaf ivy while others call it oakleaf poison ivy.

Poison oak usually does not climb as a vine but occurs as a low-growing

<sup>3</sup> *Rhus toxicodendron*

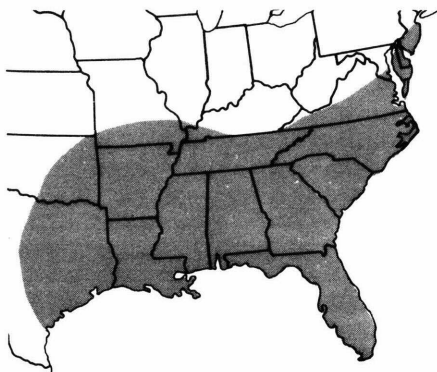
shrub. Stems generally grow upright (fig. 9). The shrubs have rather slender branches, often covered with a fine pubescence that gives the plant a kind of downy appearance. Leaflets occur in threes, as in other ivy, but are lobed, somewhat as the leaves of some kinds of oak. The middle leaflet usually is lobed alike on both margins and resembles a small oak leaf, while the two lateral leaflets are often irregularly lobed (fig. 10). The lighter color on the underside of one of the leaves is caused by the pubescence, or fine hairs, on the surface. The range in size of leaves varies considerably, even on the same plant.

### Pacific Poison Oak <sup>4</sup>

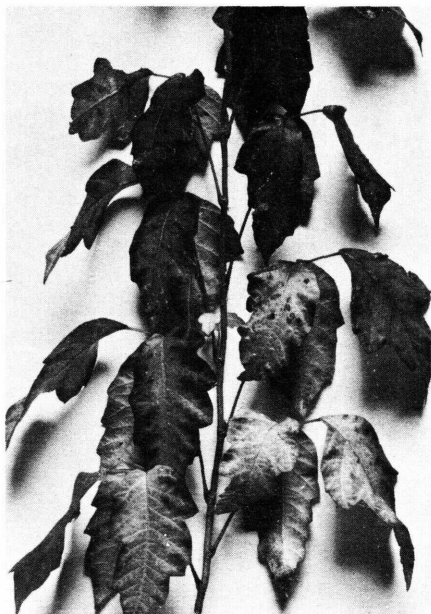
Pacific poison oak of the Pacific Coast States, usually known as poison oak, occasionally is referred to as poison ivy or yeara. This species is in no way related to the oak but is related to poison ivy.

The most common growth habit of western poison oak is as a rank upright shrub that has many small woody stems rising from the ground. It frequently grows in great abundance along roadsides (fig. 12) and in uncultivated fields or on abandoned land.

<sup>4</sup> *Rhus diversiloba*



**Figure 8. Region where the poison oak is likely to occur. Other forms also may be in the same region.**

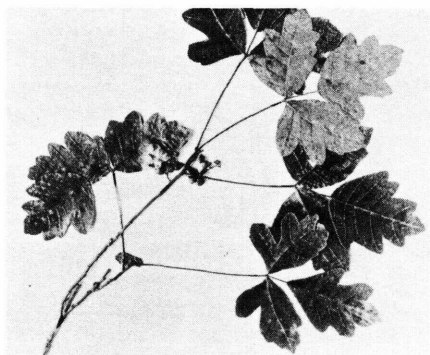


**Figure 9. Poison oak shrub.**

Pacific poison oak sometimes attaches itself to upright objects for support and takes more or less the form of a vine (fig. 13). The tendency is for individual branches to continue an upright growth rather than to become entirely dependent on other objects for support. In some woodland areas, 70 to 80 percent of the trees support vines extending 25 to 30 feet in height.

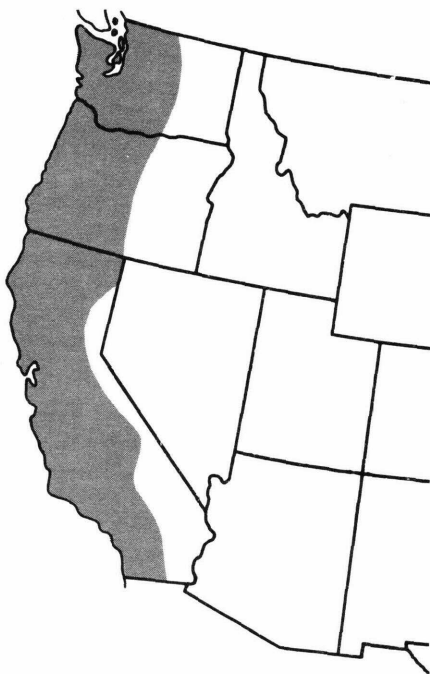
In open pasture fields, Pacific poison oak usually grows in spreading clumps from a few feet to several feet tall (fig. 14). Extensive growth greatly reduces the area for grazing. It is a serious menace to most people who frequent such areas or tend cattle that come in contact with the plants while grazing.

Low-growing plants, especially those exposed to full sunlight, often are quite woody and show no tendency for vining. These plants are common in pasture areas or along roadsides. Livestock in grazing do not invade the poison ivy shrub. As a rule, these plants spread both by rootstock and seed.



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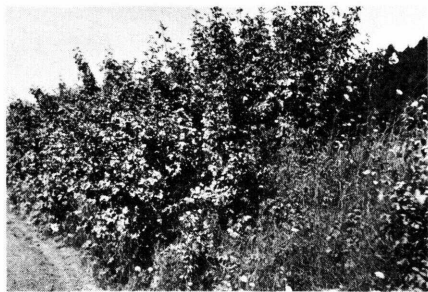
**Figure 10. Poison oak showing upper deep-green surface and lower lighter colored surface of leaves.**



**Figure 11. The region where Pacific poison oak is likely to occur. Other forms may also be in the same region.**

As in other poison ivy, leaves consist of three leaflets with much irregularity in the manner of lobing, especially of the two lateral leaflets. Sometimes lobes occur on both sides of a leaflet, giving it somewhat the semblance of





6981-B

**Figure 12.** Pacific poison oak growing along roadside. This rank, shrubby growth is typical for most localities.

an oak leaf. The middle, or terminal, leaflet is more likely to be lobed on both sides, and resembles an oak leaf more than the other two (fig. 15, *A*). Some plants may have leaflets with an even margin and no lobing whatsoever (fig. 15, *B*). The surface of the leaves is usually glossy and uneven, giving them a thick leathery appearance.

Flowers are borne in clusters on slender stems diverging from the axis of the leaf. Individual flowers are greenish white and about one-fourth inch across. The cluster of flowers matures into greenish or creamy white berrylike fruits about mid-October. These are about the size of small currants and much like other poison ivy fruits. Many plants bear no fruit, although others produce it in abundance (fig. 16). Fruits sometimes have a somewhat flattened appearance. They remain on plants throughout fall and winter and help identify poison oak after leaves have fallen.

## POISON SUMAC <sup>5</sup>

Poison sumac grows as a coarse woody shrub or small tree (fig. 17) and never in the vinelike form of its poison ivy relatives. This plant is known also as swamp sumac, poison elder, poison ash, poison dogwood, and thunderwood. It does not have variable forms, such as occur in poison

<sup>5</sup> *Rhus vernix*

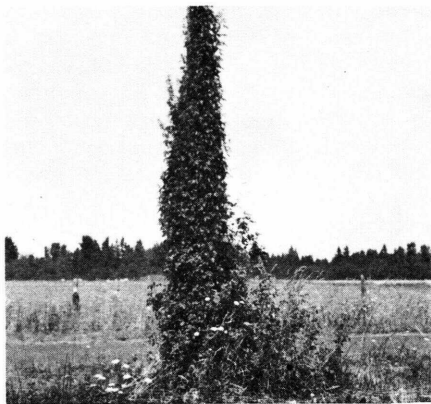
oak or poison ivy. This shrub is usually associated with swamps and bogs. It grows most commonly along the margin of an area of wet acid soil.

Mature plants range in height from 5 or 6 feet to small trees that may reach 25 feet. Poison sumac shrubs usually do not have a symmetrical upright treelike appearance. Usually, they lean and have branched stems with about the same diameter from ground level to middle height.

Isolated plants occasionally are found outside swampy regions. These plants apparently start from seed distributed by birds. Plants in dry soil are seldom more than a few feet tall, but may poison unsuspecting individuals because single isolated plants are not readily recognized outside their usual swamp habitat.

Leaves of poison sumac consist of 7 to 13 leaflets, arranged in pairs with a single leaflet at the end of the midrib (fig. 19).

The leaflets are elongated oval without marginal teeth or serrations. They are 3 to 4 inches long, 1 to 2 inches wide, and have a smooth velvetlike texture. In early spring, their color is bright orange. Later, they become dark green and glossy on the upper surface, and pale green on the lower, and have scarlet midribs. In the early



6977-B

**Figure 13.** Pacific poison oak on a telephone pole; not uncommon, especially on trees in woods.



6980-B

**Figure 14.** Pacific poison oak with fruit growing in open field as an upright shrub.

fall, leaves turn to a brilliant red-orange or russet shade.

The small yellowish-green flowers are borne in clusters on slender stems arising from the axis of leaves along the smaller branches. Flowers mature into ivory-white or green-colored fruits resembling those of poison oak or poison ivy, but usually are less compact and hang in loose clusters that may be 10 to 12 inches in length (fig. 20).

Because of the same general appearance of several common species of sumac and poison sumac, there is often considerable confusion as to which one is poisonous. Throughout most of the range where poison sumac grows, three nonpoisonous species are the only ones likely to confuse. These are the smooth sumac,<sup>6</sup> staghorn sumac,<sup>7</sup> and dwarf sumac,<sup>8</sup> which have red fruits that together form a distinctive terminal seed head (fig. 21, *B*). These are easily distinguished from the slender hanging clusters of white fruit of the poison sumac (fig. 20). Sometimes more than one species of harmless sumac grow together (fig. 21, *A*).

<sup>6</sup> *Rhus glabra*

<sup>7</sup> *Rhus typhina*

<sup>8</sup> *Rhus copallina*

## **Introduced Poisonous Sumac and Related Species**

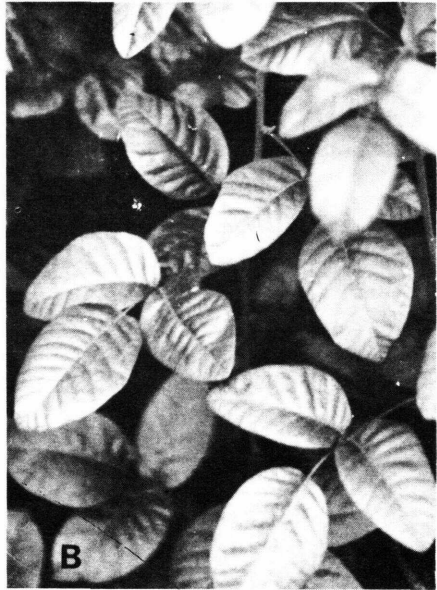
The small Japanese lacquer-tree (*Rhus verniciflua*), uncommon in the United States, is related to native poison sumac. Native to Japan and China, it may be a source of Japanese black lacquer. Poisoning has followed contact with lacquered articles. Never plant this tree.

A native shrub or small tree (*Metopium toxiferum*) called poison-wood, doctor gum, Metopium, Florida poison tree, or coral sumac is commonly found in the pinelands and hummocks of extreme southern Florida, the Keys, and the West Indies. It is much like, and closely related to, poison sumac. The shrub or small tree has the same general appearance as poison sumac. However, the leaves have only three to seven, more-rounded leaflets. Fruits are borne in clusters in the same manner as those of poison sumac, but they are orange colored and each fruit is two to three times as large. All parts of the plant are poisonous and cause the same kind of skin irritation as poison ivy or poison sumac.

When seed heads or flower heads occur on plants, it is easy to distinguish poisonous from harmless plants; however, in many clumps of either kind, flowers or fruit may not develop. The leaves have some rather distinct characteristics. Leaves of the three harmless species, often mistaken for poison sumac, are shown in figure 22.

Leaves of the smooth sumac (fig. 22, *A*) and of staghorn sumac (fig. 22, *B*) have many leaflets, which are slender and lance shaped and have a toothed margin. These species usually have more than 13 leaflets. Leaves of dwarf sumac (fig. 22, *C*) and poison sumac (fig. 22, *D*) have fewer leaflets; these are more oval shaped and have smooth or even margins. The dwarf sumac is readily distinguished from





6989-B, 6945-A

**Figure 15.** Pacific poison oak: *A*, The more common leaves with irregular margins; *B*, less typical, although not uncommon, leaves with even margins.

poison sumac by a winged midrib. Poison sumac never has the wing margin on the midrib.

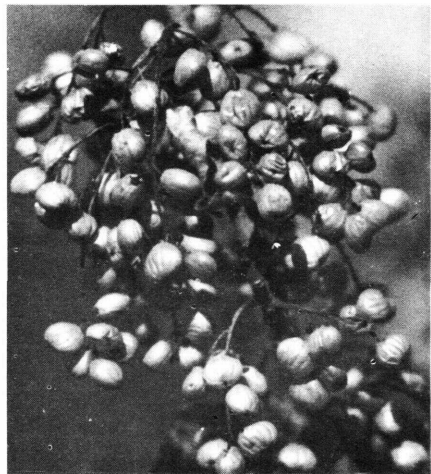
## POISONING

Many people know through experience that they are susceptible to poisoning by poison ivy, poison oak, or poison sumac. Others, however, either have escaped contamination or have a certain degree of immunity. The extent of immunity appears to be only relative. In repeated contact with the plants, persons who have shown a degree of immunity may develop poisoning.

The skin irritant of poison ivy, poison oak, and poison sumac is a non-volatile phenolic substance called urushiol, found in all parts of the plant. The danger of poisoning is greatest in spring and summer and least in late fall or winter.

Poisoning usually is caused by contact with some part of the bruised plant, as actual contact with the poison is necessary to produce dermatitis. A very

small amount of the poisonous substance can produce severe inflammation of the skin. The poison is easily transferred from one object to another.



6976-B

**Figure 16.** Pacific poison oak showing clusters of fruit after leaves have fallen.

Clothing may become contaminated and is often a source of prolonged infection. Dogs and cats frequently contact the plants and carry the poison to children or other unsuspecting persons. The poison may remain on the fur of animals for a considerable period after they have walked or run through poison ivy plants.

Smoke from burning plants carries the toxin and can cause severe cases of poisoning.

Children who have eaten the fruit have been poisoned although the fruit when fully ripe is reported as nonpoisonous. A local belief that eating a few leaves of the plant will develop immunity in the individual is unfounded. Never taste or eat any part of the plant.

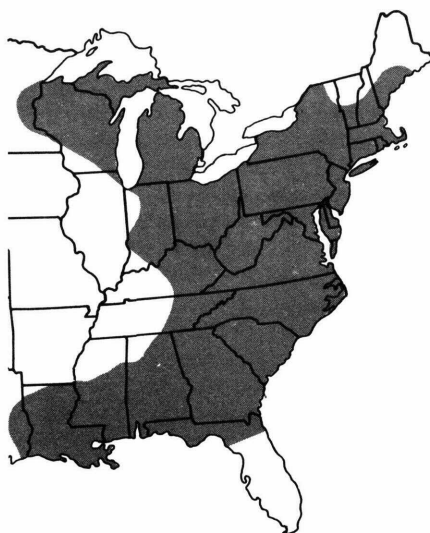
Cattle, horses, sheep, hogs, and other livestock apparently do not get the skin irritation caused by these plants, although they graze on the foliage occasionally. Bees collect nectar from the flowers, but no ill effects from use of the honey have been reported.

The time between contamination of



6999-B

**Figure 17.** Large poison sumac shrub about 15 feet tall, growing on edge of a swamp.



**Figure 18.** The region where poison sumac is likely to occur; isolated plants are sometimes found in dry soil.

the skin and first symptoms varies greatly with individuals and probably with conditions. The first symptoms of itching or burning sensation may develop in a few hours or even after 7 days or more. The delay in development of symptoms is often confusing when an attempt is made to determine the time or location when contamination occurred. The itching sensation and subsequent inflammation that usually develops into water blisters under the skin may continue for several days from a single contamination. Persistence of symptoms over a long period is most likely caused by new contacts with plants or by contact with previously contaminated clothing or animals.

Severe infection may produce more serious symptoms, which result in much pain through abscesses, enlarged glands, fever, or other complications.

If it is necessary to work among poisonous plants, some measure of prevention can be gained by wearing protective clothing. It is necessary, however, to remember that the active

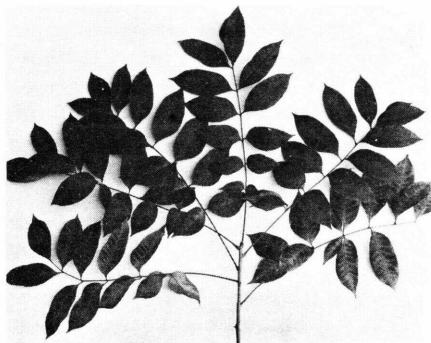


poison can be easily transferred. Some protection also may be obtained by using protective creams or lotions. They prevent the poison from contact with the skin, or make it easily removable by washing with soap and water, or neutralize it to a certain degree.

All measures to get rid of the poison must be taken within a few minutes after contact. A 10-percent water solution of potassium permanganate, obtainable in any drugstore, usually is effective if applied within 5 to 10 minutes after exposure.

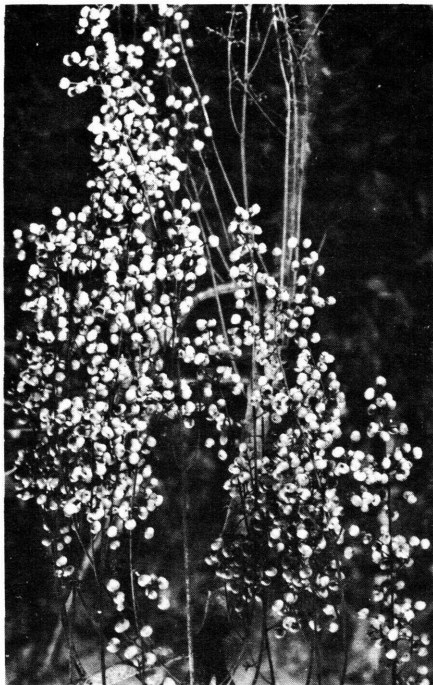
Many ointments and lotions are sold for prevention of poisoning by chemical or mechanical means. Their use should always be followed by repeated washings with soap and water to remove the contaminant.

Contaminated clothing and tools often are difficult to handle without causing further poisoning. Automobile door handles or steering wheels may, after trips to the woods, cause prolonged cases of poisoning among persons who have not been near the plants. Decontaminate such articles by thorough washing in several changes of strong soap and water. Do not wear contaminated clothing until it is thoroughly washed. Do not wash it with other clothes. Take care to



6998-B

**Figure 19.** Small branch of poison sumac with six compound leaves.



6994-B

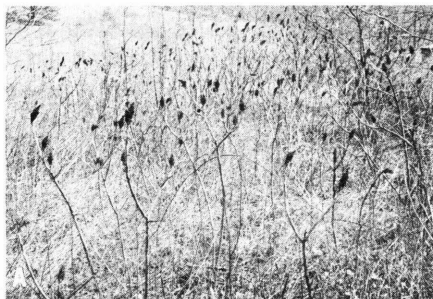
**Figure 20.** Fruit of poison sumac.

rinse thoroughly any implements used in washing. Drycleaning processes will probably remove any contaminant; but there is always danger that clothing sent to commercial cleaners may poison unsuspecting employees.

Dogs and cats can be decontaminated by washing; take care, however, to avoid poisoning while washing the animal.

There seems to be no absolute, quick cure for all individuals, even though many studies have been made to find effective remedies. Remedies may be helpful in removing the poison or rendering it inactive, and for giving some relief from the irritation. Mild poisoning usually subsides within a few days, but if the inflammation is severe or extensive, consult a physician.





6858-B, 6857-B

**Figure 21.** A, Smooth sumac and dwarf sumac growing in a mixed stand. These plants are not poisonous. B, Terminal fruiting spikes of smooth sumac, a form typical of nonpoisonous species of sumac.

## CONTROL BY MECHANICAL MEANS

Poison ivy and poison oak can be grubbed out by hand quite readily early in spring and late in fall, only if a few plants are involved. Roots are most easily removed when soil is thoroughly wet. Grubbing when soil is dry and hard is almost futile because the roots break off in the ground, leaving large pieces that later sprout vigorously. Grubbing is effective if well done.

Poison ivy vines climbing on trees should be severed at the base, and as much of the vine as possible should be pulled away from the tree. Often the roots of the tree and weed are so intertwined that grubbing is impossible without injury to the tree. Bury or destroy roots and stems removed in grubbing because the dry material is almost as poisonous as the fresh.

*Smoke from burning poison ivy plants or contaminated articles may carry the poison in a dispersed form. Take extreme caution to avoid inhalation or contact of smoke with the skin or clothing.*

Old plants of poison ivy produce an abundance of seeds, and these are freely disseminated, especially by birds. A poison ivy seedling 2 months old usually has a root that one mowing will not kill. Seedling plants at the end of the first year have well-

established underground runners that only grubbing or herbicides will kill. Seedlings are a threat as long as old poison ivy is in the neighborhood.

Plowing is of little value in combating poison ivy and poison oak.

Mowing with a scythe or sickle is not an efficient means of controlling poison ivy and poison oak. It has little effect on the roots unless frequently repeated.

Weed burners are also inefficient in controlling poison ivy and poison oak.

## CONTROL BY HERBICIDES

Poison ivy and poison oak can be destroyed with herbicides without endangering the operator. One usually may stand at a distance from the plants and apply the herbicide without touching them. Most herbicides are applied as a spray solution by sprayers equipped with nozzles on extensions 2 feet or more in length. The greatest danger of poisoning occurs in careless handling of gloves, shoes, and clothing after the work is finished.

The most satisfactory herbicides for control of poison ivy, poison oak, and poison sumac are: (1) *amitrole* (3-amino-*s*-triazole); (2) *silvex* [2-(2,4,5-trichlorophenoxy) propionic acid]; (3) *ammonium sulfamate*; and (4) 2,4-*D* [2,4-(dichlorophenoxy) acetic acid]. These herbicides

are sold under their common names and under various trade names.

Any field or garden sprayer, or even a sprinkling can, can be used for applying the spray liquid, but a common compressed-air sprayer holding 2 to 3 gallons is convenient and does not waste the spray.

Use moderate pressure giving relatively large spray droplets, rather than high pressure giving a driving mist, because the object is to wet the leaves of the poison ivy and poison oak and avoid wetting the leaves of desirable plants. High pressures cause formation of many fine droplets that may drift to desirable plants.

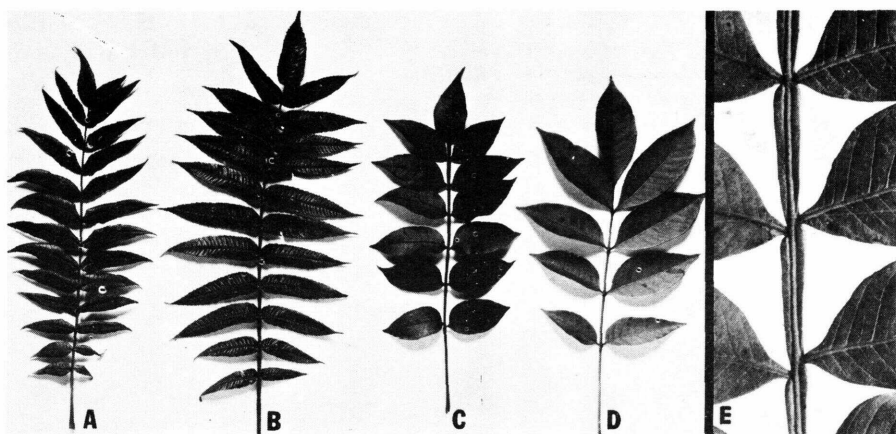
Follow the manufacturer's recommendations shown on the container label in preparing the spray solution. Cover all foliage, stems, shoots, and bark of poison plants with herbicide spray. Although best results normally are obtained soon after maximum foliage development in the spring, applications may be made up to 3 weeks before fall frost is normally expected under good growing conditions in the humid areas.

Many herbicides used on poison ivy and poison oak will injure most broad-

leaved plants. Apply them with caution if the surrounding vegetation is valuable. During the early part of the growing season, the leaves of poisonous plants usually tend to stand conspicuously apart from those of adjacent plants, and they can be treated separately if sprayed with care. Later the leaves become intermingled, and injury to adjacent species is unavoidable. Chemicals other than oil are not injurious to the thick bark of an old tree, and poison ivy clinging to the trunk safely can be sprayed with them. However, cutting the vine at the base of the tree and spraying regrowth may be more practical.

Apply sprays when there is little or no air movement. Early morning or late afternoon, when the air is cool and moist, usually is a favorable time.

No method of herbicidal eradication can be depended on to kill all plants in a stand of poison ivy and poison oak with one application. Retreatments made as soon as the new leaves are fully expanded are almost always necessary to destroy plants missed the first time, to treat new growth, and to destroy seedlings. Plants believed dead sometimes revive after many months.



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**Figure 22.** Leaves of species of sumac that are often confused: A, Smooth sumac; B, staghorn sumac; C, dwarf sumac; D, poison sumac; E, enlarged portion of dwarf sumac leaf from C, showing the wing margin of the midrib. Poison sumac does not have the winged midrib.

An area under treatment must be watched closely for at least a year and retreated where necessary.

Dead foliage and stems remaining after the plants have been killed with herbicides are slightly poisonous. Cut off dead stems and bury or burn them, taking care to keep out of the smoke.

## USE OF PESTICIDES

This publication is intended for nationwide distribution. Pesticides are registered by the Environmental Protection Agency (EPA) for countrywide use unless otherwise indicated on the label.

The use of pesticides is governed by the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended. This act is administered by EPA. According to the provisions of the act, "It shall be unlawful for any person to use any registered pesticide in a manner inconsistent with its labeling." (Section 12(a) (2) (G))

EPA has interpreted this Section of the Act to require that the intended use of the pesticide must be on the label of the pesticide being used or covered by a Pesticide Enforcement Policy Statement (PEPS) issued by EPA.

The optimum use of pesticides, both as to rate and frequency, may vary in different sections of the country. Users of this publication may also wish to consult their Cooperative Extension Service, State agricultural experiment stations, or county extension agents for information applicable to their localities.

The pesticides mentioned in this publication are available in several different formulations that contain varying amounts of active ingredient. Because of this difference, the rates given in this publication refer to the amount of active ingredient, unless otherwise indicated. Users are reminded to convert the rate in the publication to the strength of the pesticide actually being used. For example, 1 pound of active ingredient equals 2 pounds of a 50 percent formulation.

The user is cautioned to read and follow all directions and precautions given on the label of the pesticide formulation being used.

Federal and State regulations require registration numbers. Use only pesticides that carry one of these registration numbers.

USDA publications that contain suggestions for the use of pesticides are normally revised at 2-year intervals. If your copy is more than 2 years old, contact your Cooperative Extension Service to determine the latest pesticide recommendations.

The pesticides mentioned in this publication were federally registered for the use indicated as of the issue of this publication. The user is cautioned to determine the directions on the label or labeling prior to use of the pesticide.

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